Game Changing Development

Programmable Ultra Lightweight System Adaptable Radio (PULSAR)

Completed Technology Project (2012 - 2016)

Project Introduction

High performance Software Defined Radio in S-/x-band

Anticipated Benefits

NASA Funded: The S-band Frequency is overcrowded and data-stream limited. The FCC is pushing many users (cubesats) out of S-band frequencies (2 to 4 Ghz) over the next two years; which includes NASA funded missions. x-band is a great frequency range for cubesats to fall back to (8 Ghz). It has fewer users (at this time) and about 20 times the data throughput. However, there are very few software defined radios (SDRs) in this frequency that a cube sat can afford from a cost or a mass perspective. Traditional radios in this frequency range cost more than most entire cubesat budgets; same for mass. PULSAR has been working to meet this anticipated need for 3 years. Once Pulsar completes the Near-Earth- Network certification, it will be available to any U.S. Government user at a cost of less than 100k$ and mass values less than 2.5 kgs. The throughput will exceed 110 Mbits per second. Additional benefits to NASA funded missions (only) are the large FPGA (Field Programmable Gate Arrays) arrays available on board the PULSAR. There is significant real estate left inside the PULSAR for it to be programmed as a flight computer, a data pre-processor and/or an encryption processor. This type of effort would require an additional development cycle, but has a no additional mass or size benefit that is, or could be, worth the investment. NASA unfunded: Once PULSAR has a proven TRL level of 8, it can be used for modular planning cycles to assist in the estimation of future, and affordable, high-performance, data-driven cube sat missions. OGA: Once PULSAR has a proven TRL level of 8, it can be used for modular planning cycles to assist in the estimation of future, and affordable, high-performance, data-driven cube sat missions. Commercial: The PULSAR technology has been licensed to a Commercial Space Industry company called Orbital Telemetry. A PULSAR SDR can be purchased by any space industry that needs a high data rate, relatively low-cost and low mass Software Defined Radio. Nation: PULSAR is helping to bring cubesats (and high altitude balloon flight) into the high data throughput x-band regime at a lower cost of entry and operation. Thus allowing more sophisticated, yet smaller (launch affordable) science experiments and platforms.

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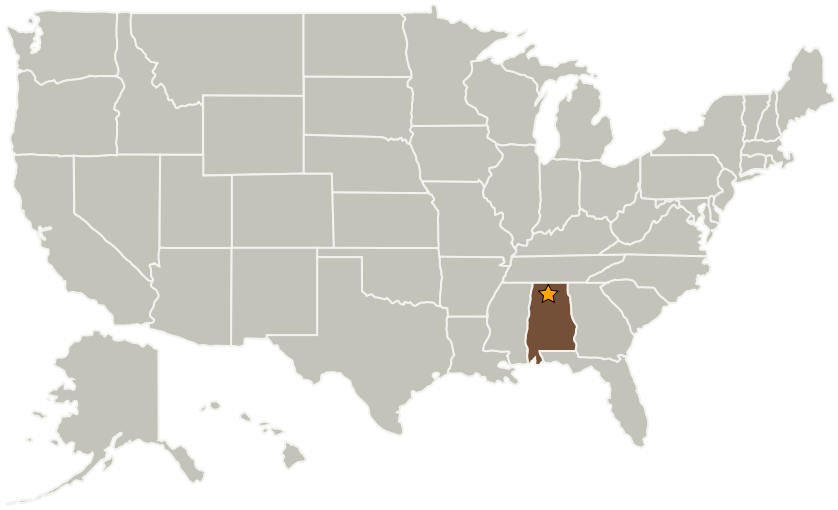
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Marshall Space Flight Center(MSFC)	Lead Organization	NASA Center	Huntsville, Alabama

Primary U.S. Work Locations
Alabama

Project Transitions

August 2012: Project Start

September 2016: Closed out

Project Website:

https://www.nasa.gov/directorates/spacetech/home/index.html

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Marshall Space Flight Center (MSFC)

Responsible Program:

Game Changing Development

Project Management

Program Director:

Mary J Werkheiser

Program Manager:

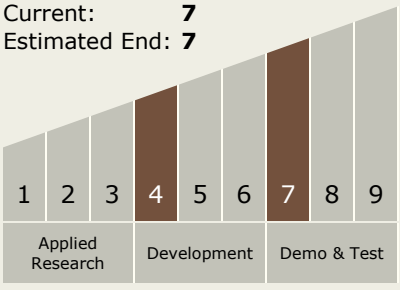
Gary F Meyering

Principal Investigator:

Arthur H Werkheiser

Technology Maturity (TRL)

Start: **4**
Current: **7**
Estimated End: **7**



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Target Destination

Earth